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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/418,441

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HARUHITO NAKAMURA

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09/09/2004

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EXAMINER

WERNER, BRIAN P

ART UNIT

PAPER NUMBER

2621

DATE MAILED: 09/09/2004

Handwritten signature

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/418,441

Applicant(s)

NAKAMURA ET AL.

Examiner

Brian P. Werner

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on see action paragraph 1.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-19, 21 and 23-34 is/are pending in the application.
- 4a) Of the above claim(s) 16, 17 and 24-29 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14, 15, 18 and 19 is/are allowed.
- 6) ☒ Claim(s) 21, 23 and 30-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. <u>13</u> . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____. | 6) <input type="checkbox"/> Other: _____. |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission have been entered:

The claim amendment received on April 19, 2004;

The drawing changes received on April 19, 2004;

The substitute specification received on April 19, 2004.

Claims 14-19, 21 and 23-34 are now pending; of which claims 16, 17, and 24-29 are withdrawn as non-elected.

Claim Objections

2. The following quotations of 37 CFR § 1.75(a) is the basis of objection:

(a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

3. Claim 30 is objected to under 37 CFR § 1.75(a) as failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention or

Art Unit: 2621

discovery. Claim 30, lines 5/6 recites, "once during each illumination". However, the claim lacks antecedent basis for "each illumination", as line 3 only requires the projection of "illumination light having a given intensity". Thus, for examination purposes, line 3 shall be interpreted as: "a projection section projecting illumination light having a given intensity a plurality of times on the object".

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 30-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Ogawa (US 5,694,203 A – art of record).

Ogawa discloses a device comprising:

a projection section projecting illumination light (figure 1, numerals 1-4) having a given intensity (the light is "pulse-modulated" at column 3, line 48; thus, the light has the intensity of the pulse peak as depicted in figure 2) a plurality of times on the object (as depicted in figure 2);

an image pickup section acquiring an image of the object (figure 1, numerals 5, 6 and 8) with a given pickup gain (the image intensifier at figure 1, numeral 6, has a given light amplification gain as described at column 6, lines 34-36) where the image is

acquired during each illumination cycle with a same pickup gain (the gain does not vary; as seen in figure 2, the image is picked up twice, as depicted at "A" and "B");

a storage section temporarily storing the image (figure 3, numeral S2; "frame (page) memory" at column 5, line 21); and

a processing section calculating distance between points on an object (figure 1, "A" and "B" on object 12; "whole distance image" at column 5, line 52) based on intensity information ("maximum value is stored in the frame memory" at column 5, line 35; the intensity of the reflected light is captured, and used to determine distance); the distance between points is detected in real time ("real time" at column 1, line 9 and column 4, line 19; "high speed" at column 1, line 65-66) within a period corresponding to the frame of a video signal ("the contents of ZBU is a distance image" at column 5, line 39; the contents of ZBUF, which corresponds to one video frame of distance data, "are obtained per one cyclical period T" at line 43; the period T is the frame rate; Also, given that the normal frame rate for a CCD camera, such as the CCD at figure 1, numeral 8, is 30 frames per second; this is one frame for every .03 seconds; whereas the image intensifier at numeral 6 in figure 1 is gated at several nanoseconds as described at column 6, line 40; thus, the CCD is capturing several distance images at a rate of several nanoseconds apart for every frame of the normal frame rate).

Regarding dependent claim 31, Ogawa discloses modulating (figure 1, numerals 1 and 2) a laser diode (figure 1, numeral 3).

Regarding dependent claim 32, Ogawa discloses means for producing an optical image of reflected light (figure 1, numeral 5), an image pickup element outputting a

Art Unit: 2621

video signal (figure 1, numeral 8), and an image intensifier between the two (figure 1, numeral 6) with a gating operation which controls gain (figure 1, GTS).

6. Claims 21, 23, 33 and 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Yahav et al. (US 6,057,909 A).

Regarding claim 33, which is representative of claim 34, Yahav discloses:

sequential illumination of an object (e.g., figure 4, numeral 72) with first and second illumination light, both having a linearly varying intensity (figure 6A, "modulation of illumination"; the leading and trailing edges of the illumination are linearly varying);

acquiring an image of the object by acquisition with a gain having a faster changing rate than the changing rate of the illumination (figure 6A, "modulation of reflected radiation"; not only is the rate of change of the leading and trailing edges faster than the illumination as seen, but the duration of the change of off-to-on is faster thus the reference meets this limitation is two ways) where the image is acquired plural times ("repeated multiple times in sequence during a single field or frame" at column 15, line 27); and

detecting a distance between individual points of the object ("three-dimensional image of the scene" at column 2, line 2; see figure 6B, "D1" and "D2" which represent distances between points) in real time within a frame of the video ("depth information substantially simultaneously from all pixels in a scene" at column 1, line 63; "frame period" at column 15, line 26).

Art Unit: 2621

Regarding claims 21 and 23, the first illumination increase with time and the second decreases with time (figure 6A, "modulation of illumination"; the leading edge increases with time and the trailing edge decreases with time, and both are linearly varying).

Allowable Subject Matter

7. Claims 14, 15, 18 and 19 are allowed. The prior art does not teach every element of the claims. For example, Ogawa does not teach sequential illumination with a first illumination light having a linearly varying intensity and a second illumination light which has a constant intensity. Yahav does not teach acquiring the image once during each illumination with a same pickup gain.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P. Werner whose telephone number is 703-306-3037. The examiner can normally be reached on M-F, 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on 703-305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2621

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Brian Werner
Patent Examiner
September 2, 2004



BRIAN WERNER
PRIMARY EXAMINER